RESPONSE TIME IS RELATED TO ATTENTION AND CERTAINTY: EVIDENCE FROM RESPONSE-RELATED AND FEEDBACK-RELATED ELECTROENCEPHALOGRAPHIC OSCILLATORY ACTIVITY

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Cognitive control can be viewed as an interplay between two constituent aspects: maintenance of task-specific processes related to attention, and non-specific regulation of motor threshold, both of them having strong influence on response accuracy and response time. Specifically, slow responses (both correct and erroneous ones) may be related to decreased attention and uncertainty. In the current study, we aimed to find out if response time might be a valid approximation distinguishing trials with high and low levels of attention and decision uncertainty. We used the auditory version of the condensation task, which is highly demanding for sustained attention while involves no inhibition of prepotent responses. We analyzed power and topography of EEG oscillations in theta, alpha, and beta frequency bands; we focused on response-related and feedback-related modulations, since “internal” response-related outcome detection is likely in conditions of attention and certainly, while “external” feedback-related outcome detection is more likely in conditions of inattention and uncertainty. We found that error-related frontal midline theta was strongest on fast erroneous trials. Late post-response posterior alpha suppression was strongest on slow erroneous trials. Feedback-related frontal beta was strongest on slow correct trials. This cumulatively supports our hypothesis and suggests that response time allows distinguishing the two types of trials, with slow trials related to lower levels of attention and higher uncertainty.

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Descriptors (keywords): cognitive control, attention, error detection

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